

TYPES OF OIL: CRUDE



Often referred to as black oil, crude oil is pumped directly from the ground in various locations around the world, including the Middle East, West Africa, the Americas and Asia. Crude oil is comprised of a highly variable mixture of hydrocarbons that need to be separated through a refining process to turn them into useable products. Products derived from crude include diesel fuel, residual fuel oil, jet fuel, kerosene, home heating oil, liquid petroleum gasses, naphtha and gasoline. Crude oil is not useable in unrefined form.

The different types of crude oil transported on Canada's West Coast include medium-grade Alaskan North Slope (ANS) and light crudes from Western Canada. This fact sheet will focus on ANS crude.

WHAT TYPE OF OIL IS CRUDE OIL?

Crude oil is a persistent oil made up of a wide variety of hydrocarbons, ranging from very volatile, light materials such as propane and benzene, to more complex heavy compounds like bitumens, asphaltenes, resins and waxes. The exact physical-chemical properties of crude are determined by the geographic source of the original oil—each deposit of crude oil has its own composition and properties. For this reason, there is no universal boiler or engine capable of running on all crude oils, and refining is necessary to create the products demanded by global markets and consumers.

WHAT TYPES OF VESSELS TRANSPORT CRUDE?

Crude oil is transported by crude tanker.

WHAT HAPPENS WHEN CRUDE SPILLS IN SEA WATER?

Because crude oils vary so widely in their physical and chemical properties, their fate and behaviour in the marine environment can differ significantly. However, crude oils spilled at sea are all affected by the same processes of weathering, which causes spreading, evaporation, dispersion, emulsification and dissolution in the early phases of a spill. Dispersion and emulsification are competing processes, with dispersion removing oil from the sea surface and emulsification causing the volume of product to increase and persist. The factors that determine whether the oil will disperse or emulsify include how much oil was spilled, its physical and chemical properties, and the sea temperature, currents, wind and sea state.

When ANS is released into the sea, approximately 15 to 20 per cent will evaporate in the first 24 hours, with very little oil dispersed into the water column. ANS tends to emulsify quickly, forming a stable emulsion (or mousse) that contains up to 75 per cent water. As the water content increases, weathering processes such as dissolution and evaporation tend to slow down. The water content can increase the volume of pollutant by a factor of up to five times.

The viscosity of the mousse typically increases rapidly, with the colour changing from a dark brown or black to light browns and rust colours. The mousse has a sticky rather than fluid texture, and can stretch and tear into smaller bits as it weathers and is exposed to increased wave action. This can result in a field of streamers, streaks, small patches and eventually tar balls (small, compact masses of heavily weathered oil), if no clean-up occurs.

HOW DOES SPILLED CRUDE AFFECT MARINE FLORA AND FAUNA?

Floating crude can endanger surface-dwelling wildlife or wildlife that frequently surfaces, including aquatic and semi-aquatic mammals, seabirds, waterfowl, turtles and aquatic insects. These species are vulnerable to acute mortality due to hypothermia from loss of insulation, oil ingestion or inhalation of toxic fumes.

While organisms are not at high risk from crude oil dispersing into the water column, stranded crude can smother shoreline organisms. When stranded on the shoreline, the degree of adhesion will vary depending on the type of substrate. A mouse of ANS crude, for example, will not penetrate deeply into finer sediments.

HOW IS CRUDE CLEANED UP?

Brush skimmers, sorbent booms and sorbent pads are very effective in removing crude oil from the surface of the sea. If crude strands on the shoreline, clean-up tactics could include shoreline flushing, manual collection or the use of heavy equipment, among other techniques.



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Sources

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